

Appl. No. 10/817,379
Amdt. dated Dec. 20, 2005
Reply to Office Action of Oct. 3, 2005

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A vehicle, comprising:
an instrument panel;
a front seat on which an occupant sits opposite said instrument panel;
a single knee protection airbag having a storage position and a deployed position, said single airbag defining a plurality of interconnected, adjoining cells; and
an inflator for inflating said airbag from said storage position to said deployed position,
said airbag being arranged to substantially fill a space between the knees and lower extremities of the occupant when seated on said front seat and said instrument panel in said deployed position such that said airbag cushions only the knees and lower extremities of the occupant.
2. (Original) The vehicle of claim 1, further comprising an anticipatory crash sensor system for forecasting a crash between the vehicle and another object prior to impact of the vehicle by the other object, said anticipatory crash sensor system being coupled to said inflator and arranged to direct said inflator to inflate said airbag prior to the crash.
3. (Original) The vehicle of claim 1, wherein said airbag comprises:
at least two pieces of substantially flat inelastic plastic film having peripheral edges, one of said at least two pieces having an inlet port for inflow of inflating fluid; and
attachment means for attaching said at least two pieces of inelastic plastic film together at least at said peripheral edges to form a substantially sealed airbag.
4. (Original) The vehicle of claim 3, wherein said airbag has interconnected chambers formed by attaching said pieces of inelastic plastic film at locations other than at said peripheral edges
5. (Currently Amended) The vehicle of claim 1, wherein said airbag comprises inelastic plastic film, said airbag having an inlet port for inflow of inflating fluid and at least one variable outlet vent, said at least one variable outlet vent comprising pressure responsive means for controlling opening of said at least one variable outlet vent to thereby control flow of gas through said at least one variable outlet [[vet]] vent in response to pressure in said airbag.

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6. (Original) The vehicle of claim 1, wherein said airbag comprises a single piece of inelastic plastic film having at least one inlet port for inflow of inflating fluid.

7. (Original) The vehicle of claim 1, wherein said airbag comprises an outer airbag made of at least one layer of plastic film and an inner airbag made of at least one layer of plastic film and arranged to fill an interior volume of said outer airbag when inflated.

8. (Original) The vehicle of claim 1, wherein said airbag comprises a first sheet of film and a member arranged in connection with said first sheet of film for arresting the propagation of a tear in said first sheet of film, said member being selected from the group consisting of (a) a network of multi-directional material strips; (b) a second sheet of film having substantially anisotropic tear properties with the direction of tear resistance of said second sheet of film being different than a direction of tear resistance of said first sheet of film; and (c) a thermoplastic elastomeric material arranged at specific locations such that said locations are thicker in comparison to an average thickness of said first sheet of film.

9. (Currently Amended) The vehicle of claim 1, wherein said airbag comprises a composite airbag having at least one layer of inelastic plastic film attached to a second layer of a more elastic plastic film, said second layer serving to blunt the propagation of a tear.

10. (Currently Amended) The vehicle of claim 1, further comprising a net surrounding said airbag during and after deployment of said airbag, said net comprising a network of multi-directional material strips.

11. (Original) The vehicle of claim 1, wherein said inflator comprises:
a gas generator for producing pressurized gas to inflate said airbag; and
aspiration means for combining gas from the passenger compartment of the vehicle with pressurized gas from said gas generator and directing the combined flow of gas into said airbag.

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12. (Currently Amended) The vehicle of claim 1, wherein said ~~airbag comprises a plurality of material sections defining a plurality of interconnected cells, said cells having a width less than a width of the occupant's knees~~ are defined by a plurality of material sections.

13. (Original) The vehicle of claim 12, wherein said airbag includes one-way valves arranged in said material sections between said cells to control flow of inflating fluid between said cells.

14. (Original) The vehicle of claim 13, wherein one of said valves leads to each of said cells, said valves being arranged to close once a predetermined pressure prevails in the respective one of said cells to prevent fluid outflow from said cell.

15. (Original) The vehicle of claim 1, wherein said airbag has a fixed vent or a variable vent for venting inflating fluid from an interior of said airbag.

16. (Original) The vehicle of claim 1, wherein said airbag is arranged to conform to the shape of the knees of the occupant.

17. (Currently Amended) A vehicle including a knee bolster airbag system for protecting the knees of an occupant of the vehicle, comprising:

[[an]] a single airbag having a plurality of interconnected, adjoining cells;

an inflator arranged to inflate said airbag; and

a housing for storing said airbag, said housing being mounted in the vehicle in a position in which said airbag engages is in a position to engage only the knees and lower extremities of the occupant upon inflation.

18. (Original) The vehicle of claim 17, wherein said airbag is dimensioned to occupy a space between the occupant's legs and structural components of an instrument panel of the vehicle when inflated.

19. (Currently Amended) A vehicle including a knee bolster airbag system, comprising:

[[an]] a single airbag having a plurality of interconnected, adjoining chambers; and

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an inflator arranged to inflate said airbag, said airbag being structured and arranged to engage deploy into a position in which it engages only the knees and lower extremities of a vehicle occupant upon inflation and ~~distribute~~ distributes impact force imposed by the knees and lower extremities over said chambers.

20. (Original) The vehicle of claim 19, wherein said airbag provides a soft surface adapted to engage the lower extremities of an occupant.

21. (Original) The vehicle of claim 19, wherein said airbag is arranged such that when inflated, said airbag occupies a space between the occupant's legs and the vehicle instrument panel such that the instrument panel provides support for said airbag.

22. (Original) The vehicle of claim 19, wherein said inflator is arranged to direct gas directly into only a portion of said chambers, said airbag comprises a plurality of one-way valves arranged between adjacent ones of said chambers to enable flow of gas from said inflator to all of said chambers.

23. (Currently Amended) A motor vehicle, comprising:
an instrument panel;

a compartmentalized airbag knee bolster device mounted to said instrument panel, said knee bolster device comprising an inflator for providing pressurized gas upon actuation thereof and a single compartmentalized airbag having a plurality of interconnected, adjoining compartments in communication with said inflator; and

mounting means for mounting said compartmentalized airbag knee bolster device to said instrument panel such that said compartmentalized airbag substantially occupies a space between said instrument panel and the knees or lower extremities of an occupant situated in front of said instrument panel when inflated, said airbag being structured and arranged to deploy into a position in which it engages only the knees or lower extremities of the occupant upon inflation.

24. (Original) The vehicle of claim 23, wherein said compartmentalized airbag comprises a plurality of material sections defining a plurality of compartments and one-way valves

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arranged in said material sections between said compartments to control flow of inflating fluid between said compartments.

25. (Canceled)

26. (Currently Amended) [[An]] In a vehicle including an instrument panel and an inflatable tubular bolster for a vehicle, the tubular bolster comprising:

[[an]] a single inflatable airbag comprising a plurality of interconnected, adjoining cells, said airbag being structured and arranged to deploy into a position entirely below the instrument panel of the vehicle;

a gas generator fluidly connected to the airbag via a gas conduit; and

a crash sensor connected to said gas generator for detecting an impact involving the vehicle such that when an impact is detected by said crash sensor, said gas generator is directed to cause said cells to be inflated and said airbag deploys from a stowed position downward and rearward into [[a]] the position entirely below [[an]] the instrument panel of the vehicle such that it restrains forward and downward movement of an occupant situated in front of the instrument panel.

27. (Currently Amended) The ~~inflatable-tubular-bolster~~ vehicle of claim 26, wherein said airbag is arranged to deploy in front of an occupant's knees and inhibits forward and downward movement of said occupant.

28. (Currently Amended) The ~~inflatable-tubular-bolster~~ vehicle of claim 26, wherein said airbag attains an internal pressure of in excess of 1 bar gage after inflation.

29-34. (Canceled)

35. (New) The vehicle of claim 1, wherein said front seat has a seat back portion, further comprising an upper airbag having a storage position and a deployed position in which the upper airbag is in a position between said instrument panel and said seat back portion to cushion a torso of the occupant, said knee protection airbag being arranged to be inflated into said deployed position to fill a void below the upper airbag and cushion only parts of the occupant's body below the torso.

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36. (New) The vehicle of claim 17; further comprising an instrument panel, a front seat on which the occupant sits opposite said instrument panel and which has a seat back portion, an upper airbag having a storage position and a deployed position in which said upper airbag is in a position between said instrument panel and said seat back portion to cushion a torso of the occupant, said housing being mounted in the vehicle in a position in which said airbag to fill a void below the upper airbag upon deployment.

37. (New) The vehicle of claim 19, further comprising an instrument panel, a front seat on which the occupant sits opposite said instrument panel and which has a seat back portion, an upper airbag having a storage position and a deployed position in which said upper airbag is in a position between said instrument panel and said seat back portion to cushion a torso of the occupant, said airbag being structured and arranged to deploy into a position in which fills a void below the upper airbag.

38. (New) The vehicle of claim 23, further comprising a front seat on which the occupant sits opposite said instrument panel and which has a seat back portion, and an upper airbag having a storage position and a deployed position in which said upper airbag is in a position between said instrument panel and said seat back portion to cushion a torso of the occupant, said compartmentalized airbag being structured and arranged to deploy into a position in which it fills a void below the upper airbag.

39. (New) A vehicle, comprising:
an instrument panel;
a front seat on which an occupant sits opposite said instrument panel;
a knee protection airbag having a storage position and a deployed position; and
an inflator for inflating said airbag from said storage position to said deployed position,
said airbag being arranged to substantially fill a space between the knees of the occupant when seated on said front seat and said instrument panel in said deployed position,
said airbag comprising a composite airbag having at least one layer of inelastic plastic film attached to a second layer of a more elastic plastic film, said second layer serving to blunt the propagation of a tear.

40. (New) A vehicle, comprising:

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an instrument panel;
a front seat on which an occupant sits opposite said instrument panel;
a knee protection airbag having a storage position and a deployed position; and
an inflator for inflating said airbag from said storage position to said deployed position,
said airbag being arranged to substantially fill a space between the knees of the occupant when seated on said front seat and said instrument panel in said deployed position,
said airbag comprising a plurality of material sections defining a plurality of interconnected cells and one-way valves arranged in said material sections between said cells to control flow of inflating fluid between said cells.

41. (New) The vehicle of claim 40, wherein one of said valves leads to each of said cells, said valves being arranged to close once a predetermined pressure prevails in the respective one of said cells to prevent fluid outflow from said cell.

42. (New) A vehicle including a knee bolster airbag system, comprising:
an airbag having a plurality of chambers; and
an inflator arranged to inflate said airbag, said airbag being arranged to engage the lower extremities of a vehicle occupant upon inflation and distribute impact force imposed by the lower extremities over said chambers, said inflator being arranged to direct gas directly into only a portion of said chambers,
said airbag comprising a plurality of one-way valves arranged between adjacent ones of said chambers to enable flow of gas from said inflator to all of said chambers.

43. (New) A motor vehicle, comprising:
an instrument panel;
a compartmentalized airbag knee bolster device mounted to said instrument panel, said knee bolster device comprising an inflator for providing pressurized gas upon actuation thereof and a compartmentalized airbag having a plurality of compartments in communication with said inflator; and
mounting means for mounting said compartmentalized airbag knee bolster device to said instrument panel such that said compartmentalized airbag substantially occupies a space between said instrument panel and the knees or lower extremities of an occupant situated in front of said instrument panel when inflated,

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said compartmentalized airbag comprising a plurality of material sections defining a plurality of compartments and one-way valves arranged in said material sections between said compartments to control flow of inflating fluid between said compartments.